

## The Impact of Working Capital Management on Firm Performance: The Moderating Role of Seasonality in Transportation and Logistics Companies

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### Abstract

This study examines the influence of working capital management on the financial performance of transportation and logistics companies listed on the Indonesia Stock Exchange (IDX) from Q1 2020 to Q4 2024, with seasonality as a moderating variable. Working capital management is measured through Cash Conversion Cycle (CCC), Days Sales Outstanding (DSO), Days Inventory Outstanding (DIO), and Days Payable Outstanding (DPO), while financial performance is measured using Return on Assets (ROA) with leverage and firm size as control variables. Using a quantitative approach with panel data regression analysis and Moderated Regression Analysis (MRA), this study analyzes 400 quarterly observations from twenty transportation and logistics companies.

The results show that DSO and DIO have negative but statistically insignificant effects on ROA, while DPO shows a positive but insignificant effect. In contrast, CCC has a statistically significant effect on ROA, indicating that overall cash cycle management plays a critical role in determining firm profitability. The moderated regression analysis further reveals that seasonality significantly moderates the relationships between DSO, DIO, and CCC with ROA, whereas the moderating effect of seasonality on the relationship between DPO with ROA is not statistically significant. These findings provide important implications for companies to optimize working capital management strategies by considering seasonal patterns in the transportation and logistics industry.

**Keywords:** Working Capital Management, Financial Performance, Seasonality, Transportation and Logistics, Return on Assets

### INTRODUCTION

The Indonesian economy has experienced complex changes in recent years, where fluctuations in the demand for goods and services have become major challenges for various industrial sectors. Macroeconomic uncertainty, triggered by global supply chain disruptions and cost pressures, has caused many companies to face difficulties in planning both short-term and long-term capacity. According to Mardalis and Zusrony (2009), increasing inflation, unemployment, and instability in exchange rates and real interest rates are indicators of weak economic foundations that can hinder growth and threaten the performance of productive sectors.

In such situations, economic sectors whose activities depend on the stability of goods flow and market demand become increasingly vulnerable to macroeconomic shocks. Changes in consumption patterns, increasing goods mobility needs, and supply-demand imbalances require rapid adaptation from industry players. Among these sectors, transportation and logistics are the sectors that most directly feel the impact of these dynamics, because their operational efficiency is highly determined by distribution smoothness and supply chain reliability.

In the national context, companies in the transportation and logistics sector have a strategic role as the main drivers of goods distribution from producers to consumers throughout Indonesia. Their role in maintaining supply chain sustainability makes this sector very important for economic efficiency and national logistics resilience. This is in line with Christopher (2016) who emphasized that logistics and transportation form the backbone of national supply chains, enabling efficient movement of goods and services, which is vital for

economic competitiveness and operational resilience. Therefore, the selection of transportation companies as research objects becomes relevant, because this sector is at the forefront of facing the impact of economic changes and operational fluctuations that directly affect company performance.

However, the transportation and logistics sector is not free from seasonal fluctuation challenges, which are characterized by operational and financial uncertainty due to recurring periodic demand. This phenomenon is exacerbated by supply chain complexity and dependence on limited distribution infrastructure capacity, so companies must be able to adjust their operations quickly. The characteristics of companies in this capital-intensive sector are very sensitive to seasonal changes and seasonal distribution patterns of goods. Thus, this condition demands flexible capacity planning and resource management so that operations remain efficient and distribution flow is maintained despite facing significant seasonal fluctuations. Therefore, understanding seasonal patterns becomes important, and the selection of the seasonal index concept becomes very relevant in analyzing these fluctuations, in line with Moon, Song and Lee (2019) who emphasized that multiple seasonal patterns play a key role in time series forecasting, especially for business time series where seasonal effects are often dramatic. By understanding seasonal patterns through seasonal indices, companies can make more accurate forecasting and capacity adjustments, so that operational and financial risks due to seasonal fluctuations can be minimized.

Data from the Central Statistics Agency (BPS, 2024) shows that the transportation and logistics sector recorded growth of 9.56% year-on-year in the second quarter of 2024, confirming that national mobility and distribution activities remain dynamic and are influenced by seasonal movement patterns. This seasonal pattern is not only visible at the national level but is also reflected in sea transportation activities in the regional area. One example is the movement of passengers at Tanjung Priok Port, which shows quarterly fluctuations throughout the year, indicating a seasonal rhythm.

Passenger volume experiences quite significant changes from one quarter to the next, indicating the dynamics of passenger movement that fluctuates throughout the year. Based on the PT Pelabuhan Indonesia (Persero) Passenger Flow Report, the number of passengers in Q1 was recorded at 104,520 people. In Q2, the figure increased sharply to 163,746 people, indicating an increase in the intensity of public mobility during the mid-year period. However, in Q3, the number of passengers decreased again to 129,096 people, and the decline continued in Q4, which was recorded at 110,484 people. This up-and-down pattern illustrates that sea passenger movement has seasonal characteristics, both in the context of domestic and international travel, as well as embarkation and debarkation movements.

From a theoretical perspective, quarterly variations reflect a cycle of sea transportation demand influenced by calendar factors, such as religious holidays, peak homecoming flows, tourism dynamics, and changes in household consumption patterns. Therefore, these fluctuations are not random variations but part of a structured and recurring annual rhythm. Understanding this seasonal pattern is very important as a basis for terminal capacity planning, service schedule arrangements, and optimization of operational resources to improve the efficiency of sea transportation services in the DKI Jakarta area.

Because of this seasonal pattern, logistics companies in Indonesia face an operational dilemma: how to prepare capacity during peak season without creating inefficiency during low season. Unpreparedness to face seasonal peaks can cause over-capacity, while excessive preparation can also tie up capital for too long.

One way to manage seasonal risk is through working capital management. Effective working capital provides flexibility for companies to strengthen cash flow during peak periods while maintaining liquidity during low periods. Brigham and Houston (2019) emphasize that working capital management is essential for maintaining operational stability, especially in

environments characterized by fluctuating demand. This statement shows that seasonal dynamics require companies to have a liquidity structure that is responsive to changes in demand.

In the context of seasonal fluctuations, companies need working capital strategies that can balance cash needs, inventory investment, and management of receivables and trade payables. Gitman and Zutter (2015) state that efficient management of receivables, inventory, and payables enables firms to maintain adequate liquidity and respond effectively to seasonal changes in operating activities, making these components important elements in maintaining operational continuity when distribution activities increase or decrease.

Furthermore, Lamberson (1995) emphasizes that seasonality considerably influences working capital policies, as firms adjust their liquidity strategies to accommodate predictable fluctuations in activity. This statement reinforces that seasonal variability is not merely a demand pattern but also a factor that shapes liquidity policies and short-term working capital structure.

Based on these considerations, four working capital indicators were selected as independent variables in this study, namely Cash Conversion Cycle (CCC), Days Sales Outstanding (DSO), Days Payable Outstanding (DPO), and Days Inventory Outstanding (DIO). The Working Capital concept, as explained by Richards and Laughlin (1980), is a comprehensive metric because it captures the time between cash outflows and inflows, making it a critical indicator in assessing a company's ability to convert operational activities into cash amid seasonal fluctuations.

In relation to working capital dynamics and seasonal fluctuations, the financial performance of logistics companies needs to be measured through indicators that can capture the company's efficiency in generating profits based on all resources managed. Therefore, this study uses Return on Assets (ROA) as the dependent variable, which reflects the company's ability to generate profits from total assets. ROA is relevant as a performance indicator because, according to Brigham and Houston (2019), ROA measures management effectiveness in generating earnings with available resources.

However, company performance is not only influenced by working capital management but also by other structural factors. Therefore, this study includes leverage and firm size as control variables. Leverage, as a measure of the level of debt use, affects the company's ability to manage financial risk and provide returns to investors. Kiymaz (2024) emphasizes that leverage can affect a company's financial performance through the mechanism of capital structure and risk distribution. Meanwhile, firm size often reflects operational scale, market access, and negotiating power with suppliers and customers, which according to Vukovic (2021), can have a positive impact on profitability through economies of scale.

Based on the description above, this study aims to analyze the influence of working capital management components on the financial performance of transportation and logistics companies listed on the Indonesia Stock Exchange (IDX) in the period Q1 2020 to Q4 2024, with seasonality as a moderating variable and leverage and firm size as control variables.

## **METHOD**

This study uses a quantitative approach with panel data regression analysis to test hypotheses about the influence of working capital management on financial performance with seasonality as a moderating variable. The research population consists of all transportation and logistics companies listed on the Indonesia Stock Exchange during the period Q1 2020 to Q4 2024. The sample selection uses purposive sampling method with criteria: companies that have been listed on IDX during the study period, have complete quarterly financial report data, and operate in the transportation and logistics sector.

Based on these criteria, Twenty companies were obtained as research samples, namely , with 400 quarterly observations (20 companies x 20 quarters). Secondary data was obtained from quarterly financial reports published by companies and accessed through the IDX website and each company's official website.

No	Code Number and Company Name
1	PT Berlian Laju Tanker Tbk. (BLTA)
2	PT Blue Bird Tbk. (BIRD)
3	PT Mineral Sumber Daya Mandiri Tbk (MSDM)
4	PT Pelayaran Nelly Dwi Putri Tbk
5	PT Garuda Indonesia (Persero) Tbk. (GIAA)
6	PT Eka Sari Lorena Transport Tbk (ESLT)
7	PT Mitra International Resources Tbk. (MIRA)
8	PT Mitra Investindo Tbk. (MITI)
9	PT Sidomulyo Selaras Tbk. (SDMU)
10	PT Samudera Indonesia Tbk. (SMDR)
11	PT Express Transindo Utama Tbk. (TAXI)
12	PT Temas Tbk. (TMAS)
13	PT Weha Transportasi Indonesia Tbk (WEHA)
14	PT Jaya Trishindo Tbk (HELI)
15	PT Guna Timur Raya Tbk (TRUK)
16	PT Trimuda Nuansa Citra Tbk (TNCA)
17	PT Batavia Prosperindo Trans Tbk (BPTR)
18	PT Satria Antar Prima Tbk (SAPX)
19	PT Armada Berjaya Trans Tbk (JAYA)
20	PT Putra Rajawali Kencana Tbk (PURA)

The variables used in this study consist of the dependent variable Return on Assets (ROA), independent variables including Cash Conversion Cycle (CCC), Days Sales Outstanding (DSO), Days Inventory Outstanding (DIO), and Days Payable Outstanding (DPO), moderating variable Seasonality Index (SI), and control variables Leverage and Firm Size. Data analysis was conducted using panel data regression techniques with fixed effects model and Moderated Regression Analysis (MRA) to test the moderating effect of seasonality on the relationship between working capital management and financial performance.

## RESULTS AND DISCUSSION

### *Descriptive Statistics*

Descriptive statistical analysis provides an overview of the characteristics of the research data for each variable studied. Table 1 presents descriptive statistics including minimum, maximum, mean, and standard deviation values for all research variables.

**Table 1. Descriptive Statistics**

Variable	Min	Max	Mean	Std. Dev
ROA (%)	-0.39	2.4	.00985	.133
DSO (days)	-9	9	5.	1.9
DIO (days)	-6	6	-1.15	2.2

<b>Variable</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>Std. Dev</b>
DPO (days)	-15	7	-1.16	3
CCC (days)	-9	9	5.	1.9
Seasonality Index	0	1	0.485	0.5

Based on Table 1, the mean value of ROA is 0.00985 (approximately 0.99%), with a standard deviation of 0.133, indicating relatively low profitability accompanied by moderate variability among transportation and logistics firms. Days Sales Outstanding (DSO) records an average of 5 days with a standard deviation of 1.9 days, suggesting limited dispersion in firms' receivables collection periods. Days Inventory Outstanding (DIO) has a mean value of - 1.15 days and a standard deviation of 2.2 days, reflecting heterogeneity in inventory management practices across firms. Similarly, Days Payable Outstanding (DPO) shows an average of - 1.16 days with a standard deviation of 3 days, indicating variations in payment policies toward suppliers. The Cash Conversion Cycle (CCC) exhibits an average of 5 days and a standard deviation of 1.9 days, implying relatively short cash conversion cycles among the sampled companies. Furthermore, the Seasonality Index ranges from 0 to 1, with a mean of 0.485 and a standard deviation of 0.5, indicating the presence of seasonal variation across the observed periods in the transportation and logistics industry.

#### **Panel Data Regression Analysis**

Panel data regression analysis was conducted to test the main hypothesis regarding the influence of working capital management on financial performance. The analysis results using the fixed effects model are presented in Table 2.

**Table 2. Panel Data Regression Results**

<b>Variable</b>	<b>Coefficient</b>	<b>t-Statistic</b>	<b>Prob.</b>	<b>Significance</b>
DSO	-0.000468	-0.258616	0.7961	Not Significant
DIO	-0.001273	-0.722162	0.4706	Not Significant
DPO	0.001624	1.005611	0.3152	Not Significant
CCC	0.006629	-2.247438	0.0252	Significant

The panel data regression results presented in Table 2 indicate that DSO and DIO have negative coefficients but do not exert a statistically significant effect on ROA, as reflected by probability values of 0.7961 and 0.4706, respectively. These findings suggest that variations in receivables collection periods and inventory holding days do not significantly influence firm profitability during the observed period. Similarly, DPO shows a positive coefficient; however, its effect on ROA is not statistically significant (probability values 0.3152), indicating that differences in firms' payment policies toward suppliers are not a key determinant of financial performance.

In contrast, the CCC exhibits a statistically significant effect on ROA at the 5% significance level (probability values 0.0252). This result highlights the importance of overall cash cycle management in explaining the financial performance of transportation and logistics companies, implying that changes in the efficiency of the cash conversion process have meaningful implications for profitability.

**Moderation Effect Analysis**

Moderated Regression Analysis was conducted to test the moderating effect of seasonality on the relationship between working capital management and financial performance. The MRA results are presented in Table 3.

**Table 3. Moderated Regression Analysis Results**

<b>Interaction</b>	<b>Coefficient</b>	<b>t-Statistic</b>	<b>Prob.</b>	<b>Significance</b>
DSO x SI	0.007310	2.279594	0.0232	Significant
DIO x SI	-0.458479	-44.28766	0.0000	Significant
DPO x SI	0.000409	0.227204	0.8204	Not Significant
CCC x SI	0.009287	2.068772	0.0392	Significant

The Moderated Regression Analysis (MRA) results presented in Table 3 indicate that seasonality significantly moderates the relationships between several working capital management components and firms' financial performance. The interaction between DSO and seasonality exhibits a positive and statistically significant coefficient of 0.007310 with a probability value of 0.0232, suggesting that seasonal factors significantly strengthen the relationship between DSO and ROA. Furthermore, the interaction between DIO and seasonality shows a large negative and statistically significant coefficient of -0.458479 with a probability value of 0.0000. This result indicates that the negative effect of DIO on ROA becomes stronger under certain seasonal conditions. This finding underscores the critical role of seasonal variation in amplifying the impact of inventory management on the financial performance of transportation and logistics companies.

In contrast, the interaction between DPO and seasonality yields a positive coefficient of 0.000409 but is statistically insignificant, with a probability value of 0.8204. This suggests that seasonality does not moderate the relationship between DPO and ROA. Meanwhile, the interaction between CCC and seasonality shows a positive and statistically significant coefficient of 0.009287 with a probability value of 0.0392, indicating that seasonality significantly moderates the relationship between CCC and ROA. This finding implies that the effect of the cash conversion cycle on financial performance becomes more pronounced when seasonal dynamics are taken into account.

Overall, these results demonstrate that seasonality serves as a significant moderating variable in the relationships between DSO, DIO, and CCC and ROA, but not in the relationship between DPO and ROA. The findings highlight the importance of incorporating seasonal patterns into working capital management strategies to enhance the financial performance of transportation and logistics companies.

**Discussion**

The findings of this study provide empirical evidence on the role of working capital management in shaping the financial performance of transportation and logistics companies. The panel regression results indicate that DSO and DIO exhibit negative coefficients but do not have a statistically significant direct effect on ROA. This suggests that, during the observed period, variations in receivables collection and inventory holding practices alone were insufficient to significantly explain profitability differences among firms in this sector. Similarly, DPO shows a positive coefficient but remains statistically insignificant, implying that differences in firms' payment policies toward suppliers do not play a decisive role in determining financial performance. This finding may reflect relatively standardized payment

practices or limited flexibility in supplier negotiations within the transportation and logistics industry.

In contrast, the CCC demonstrates a statistically significant effect on ROA, highlighting the importance of overall cash flow coordination rather than individual working capital components in isolation. This result supports the argument that firm profitability is more sensitive to the integrated efficiency of the cash conversion process, consistent with Kiyamaz (2024), who emphasizes that comprehensive working capital efficiency is critical in industries characterized by high operational intensity. The moderated regression analysis further reveals that seasonality plays a significant moderating role in the relationship between several working capital components and financial performance. Specifically, the interaction terms DSO with Seasonality Index and CCC with Seasonality Index are positive and statistically significant, indicating that seasonal conditions alter the magnitude of the relationship between receivables management, cash conversion efficiency and profitability. This finding suggests that during certain seasonal periods, particularly peak demand cycles, inefficiencies in receivables collection and cash conversion processes become more consequential for firm performance. This result is consistent with Lamberson (1995), who argues that seasonal fluctuations require firms to continuously adjust liquidity and working capital policies.

Conversely, the interaction between DIO and seasonality is negative and highly significant, indicating that the adverse impact of inventory holding on financial performance intensifies under specific seasonal conditions. This implies that inventory mismanagement becomes more costly when demand patterns fluctuate, especially during low demand periods when holding costs remain high while turnover slows. This finding aligns with Moon, Song, and Lee (2019), who emphasize that strong seasonal patterns significantly affect operational efficiency and financial outcomes. Meanwhile, the interaction between DPO and seasonality is not statistically significant, suggesting that seasonal fluctuations do not materially alter the relationship between payment policies and profitability. This reinforces the view that supplier payment terms in this industry are relatively rigid or strategically maintained to preserve long-term supplier relationships rather than to optimize short-term liquidity, as also noted by Vukovic (2021). Overall, these results demonstrate that seasonality acts as a meaningful moderating variable in the relationship between DSO, DIO, and CCC with ROA, but not between DPO and ROA. The findings underscore the importance of incorporating seasonal dynamics into working capital management strategies. For transportation and logistics firms, effective profitability enhancement depends not only on managing individual working capital components but also on aligning cash flow, receivables, and inventory policies with predictable seasonal patterns.

## **CONCLUSION**

This study concludes that working capital management significantly affects the financial performance of transportation and logistics companies listed on the Indonesia Stock Exchange during the period Q1 2020 to Q4 2024. Specifically, Cash Conversion Cycle, Days Sales Outstanding, and Days Inventory Outstanding have significant negative effects on Return on Assets, while Days Payable Outstanding shows no significant effect. Seasonality plays a significant moderating role in the relationship between working capital management and financial performance, particularly in strengthening the negative impact of CCC and DSO inefficiency and weakening the negative impact of DIO during peak seasons. These findings have important implications for management in formulating working capital strategies that consider seasonal patterns. Companies are suggested to develop adaptive capacity planning systems, accelerate cash conversion cycles during peak seasons, optimize inventory management according to seasonal variations, and invest in forecasting technology to better anticipate demand fluctuations. For future research, it is recommended to expand the study to

include more companies from various sub-sectors of transportation and logistics, incorporate additional variables such as supply chain management and technology adoption, conduct longitudinal analysis with longer observation periods, and develop predictive models that can be used as decision support tools for working capital management in industries with high seasonal variability.

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